

NAO-0001

BEST AVAILABLE COPY**REMARKS**

Claims 1-24 are pending in the present Application. Claim 1 has been amended and Claim 19 has been cancelled, leaving Claims 1-18 and 20-24 for consideration. No new matter has been introduced by way of amendment.

Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

Interview Summary

A telephonic interview was held between Patricia S. DeSimone, Dean Y. Shahriari, and Examiner Nguyen T. Ha on February 11, 2005. Applicants' previous response, dated December 27, 2004, and the Advisory Action, dated January 26, 2005 were the subject matter of the interview. Specifically, the discussion centered on the amended claims and arguments presented in Applicants' response as well as U.S. Patent No. 6,671,166 to Penneau et al.

No agreement could be reached regarding patentable subject matter.

Claim Objection

The objection to Claim 1 has been rendered moot by the amendment thereto.

First Claim Rejection Under 35 U.S.C. § 103(a)

Claims 1-11 and 14-22 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,671,166 to Penneau et al. (hereinafter "Penneau") in view of U.S. Patent No. 5,279,910 to Sasaki et al. (hereinafter "Sasaki"). Applicants respectfully traverse this rejection.

Currently amended independent Claim 1 is directed to an asymmetric supercapacitor comprising a positive electrode comprising a current collector and an active material selected from the group consisting of manganese dioxide, silver oxide, iron sulfide and mixtures thereof; a negative

NAO-0001

BEST AVAILABLE COPY

electrode comprising carbonaceous active material; an aqueous electrolyte solution; and a separator plate.

Independent Claim 21 is directed to an asymmetric supercapacitor comprising a positive electrode comprising a current collector and manganese dioxide; a negative electrode comprising carbonaceous active material; an aqueous electrolyte solution; and a separator plate.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness, i.e., that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

Applicants assert that a *prima facie* case of obviousness has not been established because Penneau and Sasaki, either individually or in combination, fail to teach or suggest all elements of Applicants' independent Claims 1 and 21. Notably absent from both the explicit disclosure and the suggestions to those having ordinary skill in the art of the cited references, is at least the feature "an aqueous electrolyte solution".

With respect to Penneau, which is entitled "Double Layer High Power Capacitor Comprising A Liquid **Organic** Electrolyte", the Examiner's attention is kindly directed to the Specification. Representative relevant portions of the Specification regarding the electrolyte have been reproduced for convenience as shown below.

The invention concerns a high power capacitor ideally polarizable consisting of a positive electrode (2) and its current collector (4), a negative electrode (3) and its current collector (5), said electrodes comprising a carbon containing material with high specific surface area, a separator (6) and a **non- aqueous liquid electrolyte** impregnating said separator and said electrodes. **The invention is characterised in that the non-aqueous liquid electrolyte is an organic solution of a sodium or**

NAO-0001

BEST AVAILABLE COPY

potassium or alkaline earth metal salt, on their own or mixed in a solvent containing an acid.

(Penneau, Abstract, emphasis added)

The invention relates to supercapacitors, or high-capacitance capacitors, comprising an electrolyte consisting of an organic solution of a salt.

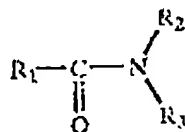
(Penneau, Column 1, lines 4-6, emphasis added)

As explicitly described and claimed in Penneau, the electrolyte is a non-aqueous electrolyte. This is undeniably in stark contrast to an aqueous electrolyte. Accordingly, Penneau fails to teach or suggest an asymmetric supercapacitor comprising, *inter alia*, an aqueous electrolyte solution, as claimed by Applicants.

Further, Applicants believe that a point of confusion regarding the teachings Penneau versus those of the instant Application lie in Applicants' Claim 20, which is directed, *inter alia*, to aqueous solutions of carbonates of alkali metals. Applicants' basis for this belief is the Examiner's statement, on Page 6 of the pending Office Action, that "...Penneau et al. disclose the electrolyte is selected from the group consisting of aqueous solutions of carbonates of alkali metals (column 5, lines 14-45)." For convenience the cited portion has been reproduced in its entirety below.

The electrolyte solution is based on an aprotic polar solvent comprising one or more amides. Among these solvents, those which have a high dielectric constant (ϵ), and a low viscosity and which maintain their liquid state over a wide temperature range are chosen.

The amides satisfy the formula:



in which:

R_1 is a hydrogen atom or a C^1 to C^3 alkyl radical, especially a methyl, ethyl or n-propyl radical; R_2 , R_3 , which are identical or different, are the hydrogen atom or a methyl, ethyl or propyl radical, preferably the hydrogen atom or the methyl radical.

NAO-0001

BEST AVAILABLE COPY

Among the amides, mention may be especially made of dimethylformamide, formamide, N-methyl-formamide, N-methylpropionamide and N,N-dimethylacetamide, by themselves or as a mixture.

The polar solvent may also comprise, as a minor compound, esters, nitrites, or carbonates. The term "minor" means that said compound does not appreciably affect the properties of the solvent (preferably <20% by weight).

Among esters, mention may especially be made of cyclic esters such as γ -butyrolactone.

Among carbonates, mention may especially be made of cyclic carbonates such as propylene carbonate.

Among nitriles, mention may especially be made of acetonitrile.

(Penneau, Column 5, lines 14-45, emphasis added)

The confusion lies in that Penneau teaches, as an additional component of the *solvent*, a liquid organic carbonate. One of ordinary skill in the art would readily recognize that the "carbonates of alkali metals", referred to in Claim 20 of the instant Application, are solid solutes that are dissolved in a water-based solvent to form the claimed "aqueous solutions of carbonates of alkali metals". One of ordinary skill in the art would just as easily recognize the distinction between these different "carbonates".

Sasaki is generally directed to a reversibly operating battery, which includes a negative electrode, a composite positive electrode, an electro-chemically active material, an electrolyte, and optionally an electron conductive material. Sasaki fails to compensate for the deficiencies, with respect to an aqueous electrolyte, of Penneau. The Examiner's attention is respectfully directed to the text of Sasaki, the relevant portions of which have been reproduced for convenience as shown below.

NAO-0001

This object of the present invention can be accomplished by a battery that comprises a negative electrode, a composite positive electrode composed of an ion-conductive high-molecular weight compound that has at least one ionic compound dissolved therein and that has a polyether structure and ion conductivity, an electrochemically active material and, optionally, an electron conductive material, and an electrolyte made of an ion-conductive high-molecular weight compound that has at least one ionic compound dissolved therein and that has a polyether structure and ion conductivity, which battery is characterized in that said composite positive electrode and said electrolyte are formed by exposure to an active radiation such as ultraviolet rays or ionizing radiation.

(Sasaki, column 2, lines 13-28, emphasis added)

In the present invention, the high-molecular weight compounds of a crosslinked network structure are formed by reaction involving exposure to an active radiation such as ultraviolet rays or ionizing radiation. Since this method is capable of completing the necessary processing within a short time at low temperature, it offers the advantage that a desired battery can be fabricated with a much higher efficiency than when the conventional thermal polymerization method is adopted.

(Sasaki, column 3, lines 35-45, emphasis added)

The electrolyte of Sasaki, as described in the Specification, is not only *organic* it is also a *solid*. This too is markedly different than an aqueous electrolyte. Therefore, Sasaki too fails to teach or suggest an asymmetric supercapacitor comprising, *inter alia*, an aqueous electrolyte solution, as claimed by Applicants.

For at least these reasons, Applicants respectfully request withdrawal of the rejection under 35 U.S.C. § 103(a) of independent Claims 1 and 21 as well as Claims 2-11, 14-18, 20, and 22, which depend from, and include all of the limitations of, their respective base claims.

Second Claim Rejection Under 35 U.S.C. § 103(a)

Claims 12-13 and 23-24 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Penneau and Sasaki as applied in the First Claim Rejection Under 35 U.S.C. § 103(a) above, and further in view of U.S. Patent No. 6,162,530 to Xiao et al. (hereinafter "Xiao"). Applicants respectfully traverse this rejection.

NAO-0001

BEST AVAILABLE COPY

Penneau and Sasaki are discussed above.

Xiao is generally directed to a chemical synthetic method for making nanoscale materials, such as manganese dioxide.

Claims 12-13 and 23-24 depend from Claims 1 and 21, respectively. Thus, Claims 12-13 and 23-24 include, *inter alia*, the feature "an aqueous electrolyte solution". As discussed in the First Claim Rejection Under 35 U.S.C. § 103(a) above, Penneau and Sasaki do not disclose or even suggest at least this feature. Furthermore, Xiao fails to compensate for the deficiencies of Penneau and Sasaki because Xiao only mentions nanoscale materials as candidates for positive electrodes. Xiao is silent regarding electrolyte materials. Thus, since the cited references, individually or in combination, fail to disclose or even suggest at least one element of the present claims, a *prima facie* case of obviousness has not been established.

Accordingly, Applicants respectfully request withdrawal of the rejection of Claims 12-13 and 23-24 under 35 U.S.C. § 103(a).

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance are requested.

BEST AVAILABLE COPY

NAO-0001

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

CANTOR COLBURN LLP

By Patricia S. DeSimone
Patricia S. DeSimone
Registration No. 4S,137

Date: February 18, 2005
Telephone (860) 286-2929
Facsimile (860) 286-0115
Customer No.: 23413